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(54) **DISCHARGE SURFACE TREATMENT ELECTRODE AND METHOD OF MANUFACTURING THE SAME**

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(58) **Field of Classification Search**
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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,770,310 A * 6/1998 Noguchi et al. 428/403
5,950,063 A 9/1999 Hens et al.
(Continued)

FOREIGN PATENT DOCUMENTS

CN 1314832 A 9/2001
CN 1798870 A 7/2006
(Continued)

OTHER PUBLICATIONS

International Search Report issued May 25, 2010 in PCT/JP10/056593 filed Apr. 13. 2010.
(Continued)

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(57) **ABSTRACT**

A discharge surface treatment electrode used in discharge surface treatment for forming a wear-resistant film on a treatment target surface of a workpiece by use of the discharge energy of electric discharges caused between the electrode and the workpiece, the film being made of a material of an electrode or a substance obtained by a reaction of the material of the electrode with the discharge energy. The discharge surface treatment electrode is formed by: compression-molding a mixed powder into a green compact, the mixed powder being formed from a powder of a Stellite alloy with an average particle size of 3 μm or less prepared by use of a jet mill and a powder of a metal with an average particle size of 3 μm or less manufactured through an atomization process or a chemical process; and subjecting the green compact to heat treatment.

6 Claims, 4 Drawing Sheets